SECTION H

DOCUMENTATION ON PERFORMANCE MEASURES
EVALUATION METHODOLOGY

May 26,1994

Mr. Robby Anderson, P.E.
Bureau of Multimodal Planning
Alabama Department of Transportation
1409 Coliseum Boulevard
Montgomery, AL 36130

Dear Mr. Anderson:

This letter outlines the performance measures and evaluation methodology that, based on our initial review of available data sources and discussion with yourself and others, seem appropriate for use in Birmingham (Metropolitan Planning Area).

PERFORMANCE MEASURES

The FHWA has put together a document, **Congestion Management State-of-the-Practice Review,** which discusses CMS related issues in detail and compiles what is being done throughout the country and what has (and more importantly, has not been) successful. We have reviewed this document in light of the local conditions present in the Brimingham IVHS/CMS project study area.

The FHWA document makes recommendations for selecting performance measures based on the study area's characteristics. The suggested method, where little transit is present (generally less than five percent of person trips), is Volume / **"Acceptable Flow** Rate" (V/AFR).

> "The capacity of a road is not always the best measure for determining the level of congestion along a given section of roadway. The driver's perception of congestion often relies more on an "acceptable flow rate", than on the actual capacity of the roadway.   The acceptable flow rate is the flow rate which the local jurisdiction judges to be acceptable and is based on such factors as the number of lanes, access control, signalized intersection spacing, intersection design, traffic control, etc. The Volume / "Acceptable Flow Rate" can measure congestion along roadway segments."
>
> **Source: FHWA Congestion Management State-of-the-Practice Review**

PB proposes that the V/AFR approach be used to calculate the quantitative congestion measure (QCM) for this study because the main input, link volume, is readily available for both existing and future conditions. The existing link volumes are collected and reported annually by the State and the results of the MPO's modeling process can provide the necessary future year link volume projections. The AFR could be based on the MPO's "LOS D capacities" used in their modeling process (TRIPS). An important benefit of the V/AFR approach is that it does not require a new or additional data collection effort.

The proposed QCM is calculated as follows:

$$QCM_i = V_i / AFR_i$$

where: QCM_i = Quantitative Congestion Measure of segment i
         V_i = Peak Hour Volume of segment i
         AFR_i = Acceptable Flow Rate in vehicles per hour of segment i

PB also proposes that the following System Wide Congestion Measure (SWCM), which may also be applied to a specific corridor as well as system wide, be used for this study. The SWCM is calculated as follows:

$$SWCM = \text{Sum of } QCM_i L_i V_i / \text{Sum of } L_i V_i$$

where: SWCM = System Wide Congestion Measure
         QCM, = quantitative congestion measure of segment i
                 (e.g., V/AFR)
         L_i = length of segment i
         V_i = peak hour volume of segment i

While V/AFR will be the primary quanitative measure, accidents can also be used to assist in the identification of congested corridors. However, the FHWA cautions that "The nature of accidents, and the way they are recorded, make it difficult to measure congestion from accident rates alone. Two major problems are that not all accidents are reported and that the exact location is not identified". For this reason, FHWA suggests that accident rates should only be used as a secondary means of identifying congestion.

PB proposes that accident rates in a corridor be used to adjust the V/FAR up or down for high and low accident segments, respectively. The magnitude of adjustment will be examined during the base conditions analysis.

For a V/AFR approach, the following items may be required for each road segment:

ANode	CMS Numbering which will correspond to a CMS node map.
BNode	
RType	('Interstate, 'U'S Route, 'State Highway, 'County, 'O'ther)
AType	('C'BD, 'Urban, 'Rural)
FType	('F'reeway, 'Expressway, 'Arterial, 'One-way, 'Collector)
NoLns	Number of lanes (both directions)
Length	Length of segment (feet)
ADT	Volume (vpd)
Fatal	Number of fatal accidents
Injury	Number of injury only accidents
PDO	Property damage only

Information such as peak to daily factors, directional splits, auto occupancy, etc. will also be required as inputs but will be entered only once as part of the calculations internal to the database. Of course, the MPO's 3x5x7 matrix of AFR by area type, facility type and number of lanes (see attached) will also be input.

As stated earlier, this approach seems reasonable given the availability of data and the goals and objectives of this study. However, the purpose of presenting this information now, early in the process is to generate comments and suggestions which can be used in the development of the final IVHS/CMS evaluation approach.

Sincerely,

William L. Cross, P.E.

cc: Mr. Bill McCombs, PB
        Mr. Chris Wellander, PB
        File

June 10, 1994

Mr. Robby Anderson, P.E.
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Dear Mr. Anderson:

PERFORMANCE MEASURES - MPO's CAPACITY TABLES

At our May 27, 1994 meeting PB proposed the use of the MPO's "LOS D capacity tables" as the *Acceptable Flow Rates* for the calculation of the Performance Measures.   Since both the State and the MPO generally look at LOS D as the desired operating condition, the use of these recently created tables seems appropriate. While you indicated your general agreement with this approach, you stated that more information on the development of the tables (specifically technical approach) was needed before a decision could or should be made.

As per your request, PB has contacted the MPO and obtained the available technical information regarding these tables. Although you were copied on there letter, dated May 31, 1994 from Carletta Singleton, a copy is attached for your convenience.

We have reviewed this information and feel that the approach used is an acceptable one.

Please review this information and advise us of your decision on the *use* of these tables in the IVHSICMS database at your earliest convenience. To meet the project schedule, PB should begin database construction on or about July 15, 1994.